



Clean Water State Revolving Fund Project Facility Plan Guidance

This document provides engineering consultants a comprehensive guide of the Missouri Department of Natural Resources' recommendations and requirements for an approvable facility plan for Clean Water State Revolving Fund, or SRF, projects. Requirements are followed by the appropriate regulatory citation.

The facility plan must include sufficient detail to demonstrate the proposed project meets applicable criteria. The data presented in the facility plan is the basis for the detailed design of the construction plans and specifications.

Facility plans must be approved by the department prior to the submittal of plans and specifications, a construction permit application and associated fee(s).
See 10 CSR 20-8.110(3)(C).

The following is a sample format for the required facility plan content:

Title Page

Include the following:

- Name of the project.
- Owner of the system.
- Contact information.
- Date of the submittal.
- Missouri registered professional engineer seal, signature and date.
See 10 CSR 20-8.110(3)(D).

Table of Contents

Identify the headers, figures, tables and appendices locations.

Introduction

State the purpose for the project. Describe the existing system, including an evaluation of the existing conditions and problems needing correction. Provide a summary of existing and previous local and regional wastewater facility planning documents, if applicable. Include any schedules of compliance, enforcement administrative orders or agreements. See 10 CSR 20-8.110(4)(C)1.

Planning and Service Area

Identify the planning area, the existing and potential future service area, the site of the project, anticipated location and alignment of proposed facilities on a map or sketch.
See 10 CSR 20-8.110(4)(C)2.

Population Projection and Planning Period

Base the present and predicted population on a 20 year planning period. Phased construction of wastewater facilities shall be considered in rapid-growth areas. Sewers and other facilities with a design life in excess of 20 years shall be designed for the extended period. See 10 CSR 20-8.110(4)(C)3 and 10 CSR 20-8.020(3)(A)2.

Existing Facilities Evaluation

Existing Collection System:

Include a brief inventory of the collection system (e.g., the approximate miles of gravity sewers and force mains, the number of pumping stations and related pumping station capacity). An analysis of the existing collection system is not required if the project is for a wastewater treatment facility only. Communities that have large collection systems need only report on the collection system in the drainage basin in which the project is located.

If an inflow/infiltration, or I/I, analysis has been conducted, present the findings of the study along with the recommendations for the most cost-effective I/I reductions.

Communities that experience sanitary sewer overflows, or SSOs, must propose a plan for the reduction and eventual elimination of these overflows. The proposed project will not have to achieve SSO elimination; however, any permit or enforcement schedules must be addressed.

Existing Wastewater Treatment Facility:

Provide a detailed description of the existing wastewater treatment facility. Include an estimate of the hydraulic and organic loading capacity for the whole facility and each process unit. The age and condition of each process unit should be evaluated and presented. Problems with the current wastewater treatment facility should be identified and recommendations made for corrections. A sketch or process diagram of the wastewater treatment facility is desired. A copy of the current Missouri State Operating Permit, or MSOP, should be provided. See 10 CSR 20-8.020(3)(A)4.

Hydraulic Capacity Determination

For consistency, use the following flow definitions as a basis for the design of sewers, pumping stations, wastewater treatment facilities, treatment units and other wastewater handling facilities. See 10 CSR 20-8.110(4)(C)4.A.

- **Design average flow** – The design average flow is the average of the daily volumes to be received for a continuous 12 month period expressed as a volume per unit time. However, the design average flow for facilities having critical seasonal high hydraulic loading periods (e.g., recreational areas, campuses and industrial facilities) shall be based on the daily average flow during the seasonal period.
- **Design maximum daily flow** – The design maximum daily flow is the largest volume of flow to be received during a continuous 24 hour period expressed as a volume per unit time.
- **Design peak hourly flow** – The design peak hourly flow is the largest volume of flow to be received during a one hour period expressed as a volume per unit time.
- **Design peak instantaneous flow** – The design peak instantaneous flow is the instantaneous maximum flow rate to be received.

Existing Systems

Flow projections for the design life of the system shall be made using actual flow data to the extent possible. Evaluate the probable degree of accuracy of data and flow projections. This reliability estimation shall include an evaluation of the accuracy of existing data, based on no less than one year of data. Also, provide an evaluation of the reliability of estimates of flow

decreases anticipated due to I/I reduction or flow increases due to elimination of SSOs and basement backups. Include critical data and methodology. Graphical displays of critical peak wet weather flow data shall be included for a sustained wet weather flow period of significance to the project. See 10 CSR 20-8.110(4)(C)4.B.

If the existing wastewater treatment facility is a lagoon, install a flow measurement device at the influent. One year of flow measurement data from this location will provide a more accurate flow representation.

New Systems

New sewer systems and wastewater treatment facilities shall be based on an average daily flow of 100 gallons per day, or gpd, per capita. Also, consider flow from industrial facilities and major institutional and commercial facilities. However, an alternate flow based on water use data or other justification, which better estimates flow, may be provided.

See 10 CSR 20-8.110(4)(C)4.C.(I). Wastewater sewer systems with a design flow less than 22,500 gpd should be determined in accordance with 10 CSR 20-8.020(9)(B). Wastewater treatment facilities with a design flow less than 22,500 gpd should be determined in accordance with 10 CSR 20-8.020(11)(B)3.

The peaking factor, determined by Figure 1 in 10 CSR 20-8.110(4)(C)4.C.(II), shall be multiplied by the projected design average flow to determine the peak hourly flow. The peaking factor accounts for normal infiltration for collection systems built with modern construction techniques. See 10 CSR 20-8.110(4)(C)4.C.(II). A peaking factor of four shall be used for sewer systems with a design flow less than 22,500 gpd. See 10 CSR 20-8.020(9)(B).

If the new collection system is to serve an existing development, the likelihood of I/I contributions from existing service lines and non-wastewater connections to those service lines shall be evaluated. Wastewater treatment facilities shall be designed accordingly to account for these additional flows. See 10 CSR 20-8.110(4)(C)4.C.(III).

Combined Sewer Interceptors

Interceptors for combined sewers shall have the capacity to receive sufficient quantity of combined wastewater for transport to wastewater treatment facilities to ensure attainment of the appropriate water quality standards. See 10 CSR 20-8.110(4)(C)4.D.

Organic Capacity Determination

For consistency, use the following organic load definitions as a basis for the design of wastewater treatment facilities. See 10 CSR 20-8.110(4)(C)5.A.

- **Biochemical Oxygen Demand** – The five day Biochemical Oxygen Demand, or BOD_5 , is defined as the amount of oxygen required to stabilize biodegradable organic matter under aerobic conditions within a five day period.
- **Total five day Biochemical Oxygen Demand, or $TBOD_5$** – $TBOD_5$ is equivalent to BOD_5 and is sometimes used in order to differentiate carbonaceous plus nitrogenous oxygen demand from strictly carbonaceous oxygen demand.
- **Carbonaceous five day Biochemical Oxygen Demand, or $CBOD_5$** – $CBOD_5$ is defined as BOD_5 less the nitrogenous oxygen demand of the wastewater.
- **Design average BOD_5** – The design average BOD_5 is generally the average of the organic load received for a continuous 12 month period for the design year expressed as weight per day. However, the design average BOD_5 for facilities having critical seasonal high loading periods (e.g., recreational areas, campuses and industrial facilities) shall be based on the daily average BOD_5 during the seasonal period.

- **Design maximum day BOD₅** – The design maximum BOD₅ is the largest amount of organic load to be received during a continuous 24 hour period expressed as weight per day.
- **Design peak hourly BOD₅** – The design peak hourly BOD₅ is the largest amount of organic load to be received during a one hour period expressed as weight per day.

Existing Systems

Projections shall be made from actual wasteload data to the extent possible. Evaluate the probable degree of accuracy of data and wasteload projections. Impacts of industrial sources shall be documented. See 10 CSR 20-8.110(4)(C)5.B.

New Systems

Domestic wastewater treatment design shall be based on at least 0.17 pounds of BOD₅ per capita per day and 0.20 pounds of suspended solids per capita per day, unless information is submitted to justify alternate designs. Impacts of industrial sources shall be documented. Data from similar wastewater treatment facilities may be used in the case of new systems. However, a thorough and documented investigation to establish the reliability and applicability of data from a similar wastewater treatment facility shall be provided. See 10 CSR 20-8.110(4)(C)5.C.

Wastewater treatment facilities with a design flow less than 22,500 gpd should be determined in accordance with 10 CSR 20-8.020(11)(B)3.

Project Alternative Analysis

The most reasonable environmentally sound and implementable waste management alternatives must be evaluated. The requirement for cost-effectiveness may be waived by the department for projects upon showing that the project provides environmentally preferable benefits (e.g., sludge utilization, water reuse or reduction). See 10 CSR 20-4.040(9)(A)1. Identify two or more alternatives, each of which is feasible and practical. See 10 CSR 20-8.020(3)(C)1.

Collection System Extensions/Rehabilitations

Discuss proposed revisions to the existing or proposed collection system including the adequacy of portions not being changed by the project. See 10 CSR 20-8.110(4)(C)8.A and 10 CSR 20-8.020(3)(C)2.

Wet Weather

Proposed wastewater treatment facilities and collection systems shall provide for transportation and treatment of all flows including wet weather flows. If bypasses have been authorized by the department, provide the appropriate documentation. See 10 CSR 20-8.110(4)(C)8.B.

Site Evaluation

Provide the appropriate site evaluation information.

Compatibility of the treatment process with the present and planned future land use, including noise, potential odors, air quality and anticipated sludge processing and disposal techniques, shall be considered. Non-aerated lagoons should not be used if excessive sulfate is present in the wastewater. Wastewater treatment facilities should be separate from habitation or any area likely to be built up within a reasonable future period and shall be separated in accordance with state and local requirements. See 10 CSR 20-8.110(4)(C)8.C.(I) and 10 CSR 20-8.020(11)(A).

Identify zoning and other land use restrictions. See 10 CSR 20-8.110(4)(C)8.C.(II).

Include an evaluation of the accessibility and topography of the site. See 10 CSR 20-8.110(4)(C)8.C.(III).

Identify areas for future wastewater treatment facility expansions. See 10 CSR 20-8.110(4)(C)8.C.(IV).

Identify the direction of prevailing wind(s). See 10 CSR 20-8.110(4)(C)8.C.(V).

Wastewater treatment facility design must take into consideration flood protection. The facility should remain operational and accessible during a 25 year flood. Facility structures, electrical and mechanical equipment shall be protected from damage during a 100 year flood.

See 10 CSR 20-8.020(11)(A)1, 10 CSR 20-8.110(4)(C)8.C.(VI) and 10 CSR 20-8.140(3)(A).

Geologic information, depth to bedrock, karst features or other geologic considerations of significance to the project shall be included. A copy of a geological site evaluation from the department's Division of Geology and Land Survey, or DGLS, providing stream determinations (gaining or losing) must be included for all new wastewater treatment facilities. A copy of a geological site evaluation providing site collapse and overall potentials from DGLS must be included for all earthen basin structures. Earthen basin structures shall not be located in areas receiving a severe overall geological collapse potential rating. See 10 CSR 20-8.020(3)(A)7 and 10 CSR 20-8.110(4)(C)8.C.(VII). The *Request for Geohydrologic Evaluation of Liquid-Waste Treatment Facility/Site*, Form - MO 780-1688 is available online at www.dnr.mo.gov/forms/index.html#Geology.

Protection of groundwater including public and private wells is of utmost importance. Demonstrate adequate protection. If the proposed wastewater facilities will be near a drinking water source or other water facility, as determined by DGLS or by the department's Public Drinking Water Branch, address the allowable distance between the wastewater facilities and drinking water sources and facilities. See 10 CSR 20-8.110(4)(C)8.C.(VIII), 10 CSR 20-8.020(3)(A)6 and 10 CSR 20-8.020(11)(A)3.

Determine soil type and suitability for construction and depth to normal and seasonal high groundwater. See 10 CSR 20-8.110(4)(C)8.C.(IX).

The location, depth and discharge point of any field tile in the immediate area of the site shall be identified. See 10 CSR 20-8.110(4)(C)8.C.(X).

Access to the receiving stream for the wastewater treatment facility outfall shall be discussed and displayed. See 10 CSR 20-8.110(4)(C)8.C.(XII).

Include a preliminary assessment of site availability. See 10 CSR 20-8.110(4)(C)8.C.(XIII).

Unit Sizing

Unit operation and preliminary unit process sizing and basis shall be discussed.

See 10 CSR 20-8.110(4)(C)8.D.

Flow Diagram

Provide a preliminary flow diagram of treatment facilities including all recycle flows.

See 10 CSR 20-8.110(4)(C)8.E.

Emergency Operations

Discuss emergency operation requirements in accordance with 10 CSR 20-8.130 and 10 CSR 20-8.140. See 10 CSR 20-8.110(4)(C)8.F, 10 CSR 20-8.020(10)(B) and 10 CSR 20-8.020(11)(C)2.

No-discharge Option

Consideration shall be given to the feasibility of constructing and operating a no-discharge wastewater treatment facility. See 10 CSR 20-6.010(4)(D)1 and 10 CSR 20-8.110(4)(C)8.G.

Regionalization:

Consideration should be given to the transport of wastewater to a regional wastewater treatment facility, when feasible. See 10 CSR 20-6.010(3)(C).

Decentralized Options

Consideration should be given to centralized management of on-site wastewater systems for unsewered communities.

Technology not included in 10 CSR 20-8

Identify any innovative or new technology, for which the review process will be as stated in 10 CSR 20-8.140(5)(B). See 10 CSR 20-8.110(4)(C)8.H and 10 CSR 20-8.020(11)(B)2.

Deviations from 10 CSR 20-8

If this project contains known deviations from 10 CSR 20-8, submit the documentation and justification for the deviation. Note that many deviations are common while others are reviewed on a case-by-case basis. See 10 CSR 20-8.110(4)(C)10.

Biosolids

Discuss of solids handling, disposal options and method selected. Compliance with the requirements of 10 CSR 20-8.170 and any conditions in the applicants' MSOP must be assured. See 10 CSR 20-8.110(4)(C)8.I.

Treatment during Construction

Include the plan for the method and level of treatment to be achieved during construction. The treatment during construction plan must be approved by the department and implemented by inclusion in the plans and specifications. See 10 CSR 20-8.110(4)(C)8.J.

Operation and Maintenance

Portions of the project that involve complex operation or maintenance requirements shall be identified including laboratory requirements for operation, industrial sampling and self monitoring. See 10 CSR 20-8.110(4)(C)8.K.

Communities that do not propose to employ a full-time operator, 40 hours per week, must evaluate passive or easy-to-operate treatment alternatives before considering a mechanical activated sludge package plant. Examples of passive or easy-to-operate treatment systems include, but are not limited to, enhanced natural systems, submerged fixed film systems, sand filters and recirculating pea gravel filters. See 10 CSR 20-4.040(9)(B).

Cost Estimates

Cost estimates for capital and operation and maintenance must be included for each alternative. See 10 CSR 20-8.110(4)(C)8.L. Include the total project cost (construction, engineering, land acquisition, legal and administrative costs) analysis and a 20 year present worth cost estimate for each alternative.

Water Quality Reports

The department's determination of probable effluent limits must be included. Proposed wastewater treatment facilities shall provide for meeting the effluent limitations as determined by the department with the use of 10 CSR 20-7.015 and 10 CSR 20-7.031. See 10 CSR 20-4.040(9)(A)1. Supply the Antidegradation Review Report in accordance with 10 CSR 20-7.031(2), the Water Quality Antidegradation Review determination by the department and any special water quality studies completed by or on behalf of the applicant. See 10 CSR 20-8.110(4)(C)8.N. More information concerning the antidegradation review process is available online at www.dnr.mo.gov/env/wpp/permits/antideg-implementation.htm.

208b Plans

The project shall be consistent with the approved elements of any applicable water quality management plan under Section 208b of the Federal Clean Water Act. See 10 CSR 20-6.010(9)(F). Contact the department for a list of cities that have 208b management plans.

Projects are encouraged to use energy and water conservation technologies.
See 10 CSR 20-4.040(9)(D).

Recommended Project Alternative Summary and Justification

Identify the recommended alternative and provide justification.

Provide the following costs and an estimation of how long these costs are applicable for the recommended project:

- Construction.
- Engineering.
- Land.
- Legal.
- Administrative costs.
- Operation and maintenance.
- Average user charge, including documentation of the basis of the estimate.
See 10 CSR 20-4.040(9)(A)2 and 10 CSR 20-4.040(17).

For the recommended alternative, include the following:

- Wastewater treatment facility design average and peak flows.
- Wastewater treatment facility design organic loading.
- For wastewater treatment facility improvement projects, indicate what treatment units are to be upgraded or added.
- For collection system projects, indicate the average and peak hourly flow requirements for sewers and pumping stations.
- Engineering criteria used for preliminary sizing of facilities.

Appendices

The following information shall be included in the appendices upon request of the department depending on the complexity of the proposed project. All design data shall be considered preliminary for review purposes by the department. See 10 CSR 20-8.110(4)(D).

Process Facilities

Provide the criteria and basis of selection, hydraulic and organic loadings (e.g., minimum, average and maximum) and the effect on wastewater and sludge processes, unit dimensions, rates and velocities, detention concentrations, recycle, chemical additive control, physical control and flow metering, removal efficiencies, effluent concentrations, energy requirements and flexibility. See 10 CSR 20-8.110(4)(D)1.

Process Diagrams

Provide diagrams depicting process configuration, interconnecting piping, processing, flexibility, hydraulic profile, organic loading profile, solids profile, solids control system and flow diagram with capacities. See 10 CSR 20-8.110(4)(D)2.

Laboratory

Discuss physical and chemical tests and the frequency to control processes, time for testing, space and equipment requirements, description of the laboratory facility, and personnel requirements (e.g., number, type, qualifications, training, salaries and benefits).
See 10 CSR 20-8.110(4)(D)3.

Operation and Maintenance

Discuss routine and special maintenance duties, time requirements per duty, tools necessary, spare parts list, equipment, vehicles, safety, maintenance workspace and storage and personnel requirements (e.g., number, type, qualifications, training, salaries and benefits).

See 10 CSR 20-8.110(4)(D)4.

Chemical Control

Identify processes needing chemical addition, type of chemicals, feed equipment and associated costs. See 10 CSR 20-8.110(4)(D)5.

Collection Systems Control

Discuss cleaning and maintenance, regulator and overflow inspection and repair, flow gauging, industrial sampling and surveillance, ordinance enforcement, equipment requirements, trouble-call investigations and personnel requirements (e.g., number, type, qualifications, training, salaries and benefits). See 10 CSR 20-8.110(4)(D)6.

Control Summary

Identify personnel, equipment, chemicals, utilities and power requirements of major units.

See 10 CSR 20-8.110(4)(D)7.

Additional Submittals for Facility Plan Approval

The information in the remainder of the document is typically submitted after the facility plan.

Provide the following information for facility plan approval by the department.

Environmental Review

The department will make the environmental determination. The proposed project could demonstrate a need for a categorical exclusion, or CATEX, or a finding of no significant impact/ environmental assessment, or FONSI. Supply the department with the appropriate environmental information so that the appropriate determination may be made.

Provide documentation of compliance with planning requirements of local government agencies.

See 10 CSR 20-8.110(4)(C)8.M.

CATEX

Supply sufficient documentation of the following to the department:

- A statement indicating the project is cost-effective and the applicant is financially capable of constructing, operating and maintaining the facilities. See 10 CSR 20-4.050(2)(A)2.
- Provide plan map(s) of the proposed project showing the location of all construction areas, the planning area boundaries and any known environmentally sensitive areas.
See 10 CSR 20-4.050(2)(A)3.

FONSI

An environmental information document, or EID, must be submitted for applicants whose proposed project has a FONSI environmental determination. See 10 CSR 20-4.050(2)(B).

At a minimum, the EID shall contain the following:

- The environmental setting of the project and the future of the environment without the project.
- The potential environmental impacts of the project as proposed including those which cannot be avoided.
- The relationship between the short term uses of the environment and the maintenance and enhancement of long term productivity.
- Any irreversible and irretrievable commitments of resources to the proposed project.
- Documentation of coordination with appropriate governmental agencies.

The clearance letters from the following agencies are required for a FONSI. If any of these clearance letters are deemed unnecessary, provide justification.

Historic Preservation:

Missouri Department of Natural Resources
State Historic Preservation Program
P.O. Box 176
Jefferson City, MO 65102
800-361-4827
www.dnr.mo.gov/shpo/index.html

Missouri Federal Assistance Clearinghouse:

Office of Administration
Missouri State Capital Building, Room 125
P.O. Box 809
Jefferson City, MO 65101
573-751-0337
www.oa.mo.gov/co/mofedasst/

Division of State Parks:

Missouri Department of Natural Resources
Division of State Parks
P.O. Box 176
Jefferson City, MO 65102
800-334-6946
www.mostateparks.com

Division of Geology and Land Survey:

Missouri Department of Natural Resources
Division of Geology and Land Survey
Geological Survey Program
P.O. Box 250
Rolla, MO 65401
800-361-4827
www.dnr.mo.gov/geology/index.html

Missouri Department of Conservation:

P.O. Box 180
Jefferson City, MO 65102
573-522-4115
mdc.mo.gov

U.S. Fish and Wildlife Service:

Missouri Ecological Services Office
101 Park DeVille Drive
Suite A
Columbia, MO 65203
573-234-2132
www.fws.gov

Corps of Engineers District Office:

The State of Missouri is divided between three different Corps of Engineers Districts: the Omaha District, the Kansas City District and the Little Rock District. The district boundaries and addresses for the appropriate district office can be found online at www.swt.usace.army.mil/address/addressPAO.cfm.

Public Participation

Public participation must be held to allow the public an opportunity to provide input during the project development. A public meeting to discuss alternative engineering solutions and a public hearing to discuss the estimated user charge rate are required. An environmental impact public hearing is required for applicants that the department has determined necessitate a FONSI.

Most applicants elect to hold all three public meeting/hearings on the same date, for ease of coordination. Note that the public meeting and hearings are separate events and must be opened and closed in an official manner. If an applicant elects to advertise for these public meeting/hearings together, each must be addressed separately with a specific beginning time.

Alternative Engineering Solutions Public Meeting

Conduct a public meeting to discuss the alternative engineering solutions presented for the project. See 10 CSR 20-4.040(14)(A). Provide documentation of the advertisement (e.g., publisher's affidavit) and verification of the public meeting (e.g., attendance record and meeting minutes).

At a minimum, the following information should be presented during the public meeting:

- Discuss the problems that have created the need to design and construct the proposed project.
- Discuss the alternatives that were evaluated.
- Discuss the recommended alternative and how this project will meet the required needs.

Estimated User Charge Rate Public Hearing

Conduct a public hearing to discuss the proposed user charge rates and how they were derived. This public hearing shall be public noticed 30 days prior to the hearing date. Provide documentation of the public notice. The applicant shall prepare a transcript, recording or other complete record of the public hearing for department review. See 10 CSR 20-4.040(14)(B).

At a minimum, the following information should be presented during the public hearing:

- Outline how the applicant will finance the costs of the recommended project.
- Discuss what additional costs will result from the project.
- Discuss the estimated user charge rates that will be necessary to fund the project.
- Discuss when any increases will go into effect.

Environmental Impact Public Hearing

Conduct a public hearing to discuss the environmental impacts of the proposed project. This public hearing shall be advertised in a local newspaper of general circulation 30 days prior to the hearing date. Provide the publisher's affidavit as documentation of the public notice. A verbatim transcript of the public hearing shall be provided for department review. Any written or verbal testimony and the applicant's responses to the issues raised shall be recorded in the transcript. Include with the transcript, a list of all attendees with addresses. See 10 CSR 20-4.050(2)(B)2.

At a minimum, the following information should be presented during the public hearing:

- Discuss how the project will impact wetlands, floodplains, threatened or endangered species, cultural resources, prime farmland, public lands and parks.
- Discuss how the proposed project may impact the development pattern of the area.
- Discuss the environmental clearances requested from coordinating agencies.
- Discuss the impact on personal property such as driveways, trees and easements.
- Discuss the impact on water quality and air quality.

For More Information

Missouri Department of Natural Resources

Water Protection Program

P.O. Box 176

Jefferson City, MO 65102-0176

800-361-4827 or 573-751-1300

www.dnr.mo.gov/env/wpp